

ADDITIONS TO NEARCTIC *TRICHOGRAMMA*  
(HYMENOPTERA: TRICHOGRAMMATIDAE)

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*Abstract.*—Six new species of *Trichogramma* are described and compared to other members of the genus. The new species are *T. thalense*, *T. nomlaki*, *T. browni* and *T. inyoense* from California, *T. drepanophorum* from Mississippi, and *T. offella* from Louisiana.

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Since 1970, we have accumulated numerous unidentifiable populations of *Trichogramma* from North America. Many of these differ marginally from already named species and clarification of their taxonomic status must await detailed morphometric and bionomic investigations. Here we describe six new species from the United States which are easily separated from known congeners. Four are from California and two from southeastern states. These additions increase the number of described species of Nearctic *Trichogramma* to 26. As most areas of the continent have been sampled poorly or not at all, a significant portion of the fauna probably remains unknown.

We use the same terminology in the descriptions as in earlier papers (e.g. Pinto et al., 1978). Acronyms associated with the various structures of the male genitalia are introduced in the first description and used commonly thereafter (also see Figs. 1, 3). Quantitative data represent the mean standard deviation, followed by the range and sample size. All measurements represent maximum dimensions except for the anterior and posterior vein tracts of the hind wings, where the lengths and setal counts are determined from the level of the hamuli to the wing apex.

Specimens were mounted in Hoyer's medium for study. Holotypes and allotypes have been remounted in Canada balsam, ensuring more permanent mounts. Specimens remaining in Hoyer's medium have been ringed twice with Glyptal® to prevent desiccation.

Holotypes and allotypes are deposited in the collection of the United States Museum of Natural History, Washington, D.C. Paratype males are deposited in the collections of the divisions of Biological Control, University of California (Berkeley & Riverside), the British Museum, and United States National Museum.

*Trichogramma thalense* Pinto & Oatman, NEW SPECIES

Fig. 1a, b

Description based on culture material originating from San Luis Obispo and San Joaquin counties, California; reared on *Trichoplusia ni* (Hübner) eggs at 23–27°C and ca. 50% R.H.

Color.—Based on females preserved in 70% ethanol. Light yellow except pronotum, abdomen and coxae yellow brown.

Male.—*Length*: ca. 0.6 mm. *Antenna*: Flagellum elongate, broadly arcuate at base,  $6.35 \pm 0.53$  (5.5–6.9) ( $n = 8$ ) as long as wide,  $1.06 \pm 0.03$  (1.0–1.1) ( $n = 9$ ) as long as hind tibia; setae moderately long, tapering gradually from base to apex, length of longest seta  $2.96 \pm 0.2$  (2.7–3.2) ( $n = 9$ ) maximum width of flagellum, ca. 32–42 in number. *Forewing*: Vein tracts well defined, moderate number of setae between tracts, 38–61 setae in area between 4th and 5th tracts; length of longest postapical seta on margin ca.  $2 \times$  maximum width of hind tibia and 0.2 greatest width of wing. *Hindwing*: Posterior vein tract complete almost to apex of wing, setae slightly increasing in length apically; anterior tract with 4–7 setae. *Mesoscutellum*: Anterior pair of setae moderately long, varying from 0.2–0.6 length of posterior pair. *Genital capsule*: Elongate, moderately narrow,  $0.34 \pm 0.02$  (0.3–0.4) ( $n = 9$ ) as wide as long, constricted at base of gonostyli and usually at middle; gonostyli (from apex to base of median ventral projection) comprising ca. 0.15 the length of genital capsule; dorsal expansion of gonobase (DEG) slightly lobed at base, posterior extension elongate and very narrow, its subapical width ca. 0.2 the distance between apex of gonostyli, apex of DEG usually anterior to apex of chelate structures, attaining  $0.89 \pm 0.03$  (0.8–0.9) ( $n = 9$ ) length of genital capsule; median ventral projection (MVP) short and slender, apex coinciding closely with that of DEG (but see Remarks) and remote from apex of chelate structures, MVP occupying no more than 0.2 the distance from its base to apex of gonostyli, attaining  $0.87 \pm 0.02$  (0.8–0.9) ( $n = 9$ ) length of genital capsule; chelate structures (CS) approximating apex of gonostyli, occupying ca. 0.75 distance from base of MVP to apex of gonostyli, attaining  $0.96 \pm 0.02$  (0.94–0.98) ( $n = 9$ ) length of genital capsule; chitinized ridge (CR) long, distinct, occupying ca. 0.6 distance from MVP to base of genital capsule. *Aedeagus*:  $0.66 \pm 0.04$  (0.6–0.7) ( $n = 9$ ) as long as hind tibia and ca. same length as genital capsule, apodemes comprising  $0.48 \pm 0.02$  (0.4–0.5) ( $n = 9$ ) total length of aedeagus.

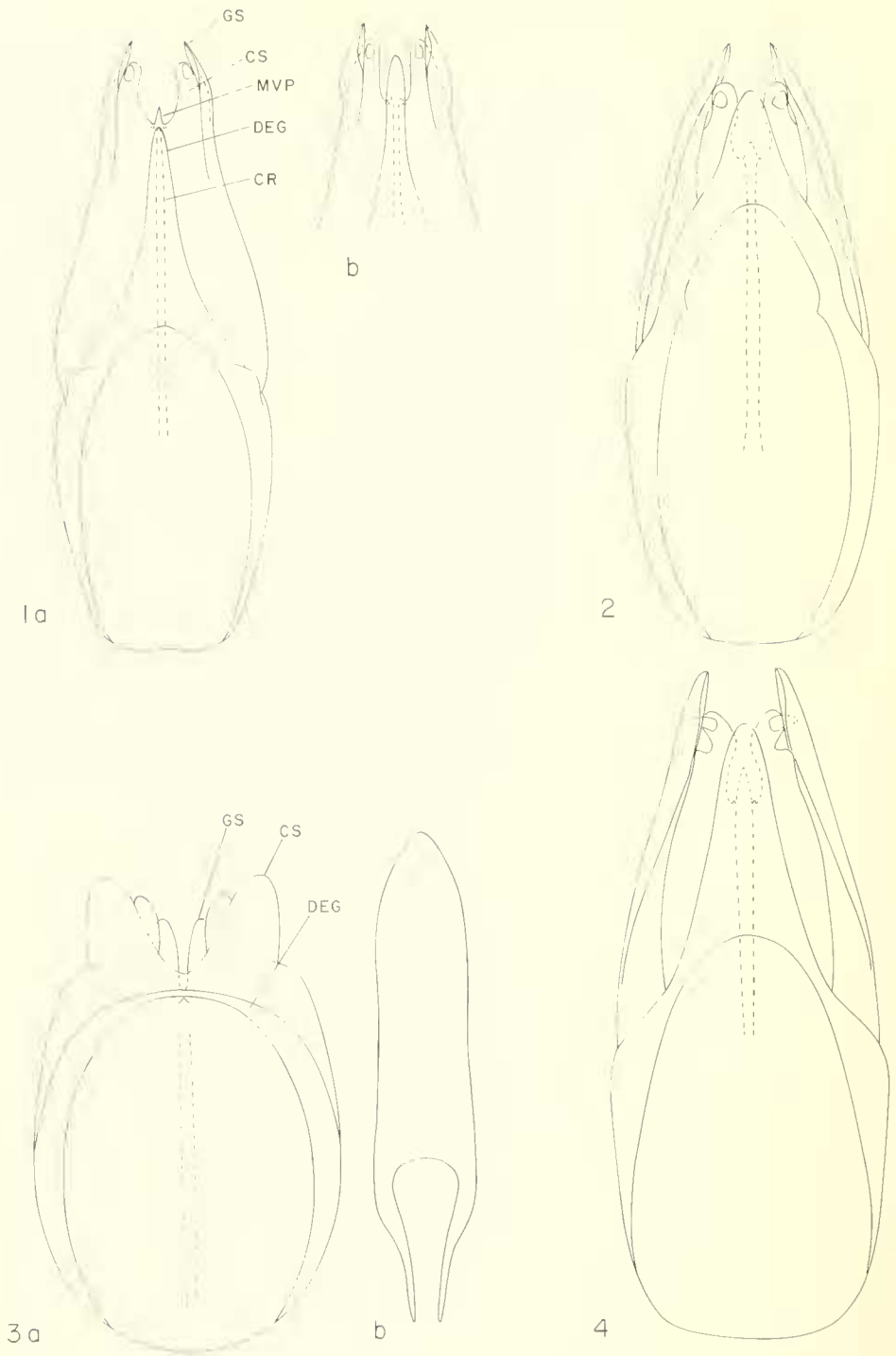
Female.—*Ovipositor*:  $0.77 \pm 0.01$  (0.7–0.8) ( $n = 5$ ) as long as hind tibia.

Type information.—Holotype ♂ and allotype ♀ from CALIFORNIA, San Joaquin Co., Linden; ex. undetermined Noctuidae egg on *Malva parviflora* L.; 10 September 1978; E. R. Oatman, collr.

Geographic distribution.—California and Texas, USA.

Records.—UNITED STATES. *California*: Colusa Co., ex. *Heliothis zea* eggs on tomato. Riverside Co., Menifee Valley, hills on west end, 24/29 October 1981, in pan trap. San Luis Obispo Co., Paso Robles, ex. undetermined Noctuidae eggs on *Malva parviflora*, 22 September 1981. San Joaquin Co., Linden ex. undetermined Noctuidae eggs on *M. parviflora*, 10 September 1978; Stockton, ex. *Vanessa* sp. eggs on *M. parviflora*, 12 September 1978. Yuba Co., Marysville, ex. *Vanessa* sp. egg on *M. parviflora*, 7 June 1983. *Texas*: Castro Co., ex. *Diatraea grandiosella* eggs on corn, 3 August 1982.

Remarks.—*Trichogramma thalense* is similar to several other species characterized by a narrow, elongate DEG. It differs from the three Hawaiian species with this trait (*T. vargasi* Oatman & Platner, *T. perkinsi* Girault, and *T. higai* Oatman & Platner) in several respects (see Oatman et al., 1982) but most conspicuously by the longer male flagellum (as long or longer than hind tibia). Also,



Figs. 1-4. Male genitalia of *Trichogramma* spp. (dorsal view). 1a, *T. thalense*, Linden. CA (length = 0.12 mm); 1b, same, Castro Co., TX. 2, *T. browningi* (length = 0.12 mm). 3a, *T. nomlaki* (genital capsule, length = 0.10 mm); 3b, same, aedeagus. 4, *T. offella*, (length = 0.11 mm). GS = gonostyli; CS = chelate structures; MVP = median ventral projection; DEG = dorsal expansion of gonobase; CR = chitinized ridge.

the flagellar setae of *T. higai* and *T. perkinsi* are shorter than those of *T. thalense* (less than  $2\times$  the maximum width of flagellum).

Males of other similar species are separated from *T. thalense* as follows: *T. lacustre* Sorokina (1978) by the less abruptly narrowed and much longer DEG, the lack of a constriction at the base of the gonostyli, and by the much shorter flagellum; *T. principia* Sugonjaev & Sorokina (1976) by the shorter flagellar setae (only  $2\times$  as long as flagellar width), uniquely shaped genital capsule, and longer apodemes of the aedeagus; *T. raoi* Nagaraja (1973) by the much longer flagellar setae ( $4\times$  greater than flagellar width), inconspicuous MVP, and the broader genital capsule which lacks a constriction at the base of the gonostyli; *T. parkeri* Nagarkatti (1975) by the more elongate genital capsule (ca. 0.25 as wide as long) and the longer aedeagus (subequal to hind tibial length); *T. pintoi* Voegele (1982) (*T. euproctidis* of Nagarkatti & Nagaraja, 1971) by the triangular DEG, and more elongate genital capsule (ca. 0.28 as wide as long); *T. brassicae* Voegele by the shorter flagellar setae (ca.  $1.5\times$  greatest flagellar width), and the shorter and broader DEG.

Specimens of *T. thalense* from California and Texas are similar except for the length of the DEG. In California material the apex of the posterior extension of the DEG approximates the base of the MVP (Fig. 1a); in material from Castro Co., Texas it extends to a point ca. half the distance from the base of the MVP to the apex of the gonostyli (Fig. 1b). Also, we have been able to maintain the Texas population in culture on *T. ni* eggs, whereas all California populations were lost after a few generations. Therefore, cross-breeding studies could not be conducted between California and Texas material.

Etymology.—“Of the Valley.” *Thal* is of German origin.

### *Trichogramma browningi* Pinto & Oatman, NEW SPECIES

Fig. 2

Description based on culture material originating from all locales noted in Records (below); material reared on *Trichoplusia ni* eggs at 23–27°C and ca. 50% R.H.

Color.—Based on specimens mounted in Hoyer's medium. Both sexes dark brown except antenna, hind portion of thorax, fore and middle legs, and tibiae and tarsi of hind leg paler.

Male.—*Length*: 0.5–0.7 mm. *Antenna*: Flagellum elongate, broadly arcuate at basal half,  $6.79 \pm 0.40$  (6.3–7.6) ( $n = 12$ ) as long as wide,  $1.09 \pm 0.03$  (1.06–1.11) ( $n = 12$ ) as long as hind tibia; setae moderately long, tapering gradually to apex, length of longest seta  $3.15 \pm 0.13$  (2.9–3.3) ( $n = 12$ ) maximum width of flagellum, ca. 39–46 in number. *Forewing*: Vein tracts well defined, area between 4th and 5th tracts with 22–50 setae; length of longest seta on post-apical margin ca.  $2\times$  maximum width of hind tibia and 0.2 maximum width of wing. *Hindwing*: Posterior vein tract of 5–9 setae, extending from 0.4–0.8 length of middle tract; anterior tract absent or with no more than 2 setae. *Mesoscutellum*: Anterior pair of setae varying from 0.2–0.6 length of posterior pair. *Genital capsule*: Moderately broad,  $0.41 \pm 0.01$  (0.38–0.44) ( $n = 12$ ) as wide as long; gonostyli from apex to base of MVP comprising ca. 0.2 length of genital capsule; DEG broadly subtriangular, not notched or lobed at base or only slightly so, subapical width ca. 0.6 distance between apex of gonostyli, apex attaining  $0.91 \pm 0.01$  (0.88–0.93) ( $n =$

12) length of genital capsule: MVP short, subtriangular apex anterior to that of DEG and CS, attaining  $0.82 \pm 0.01$  (0.80–0.84) ( $n = 12$ ) length of genital capsule; CS attaining  $0.91 \pm 0.01$  (0.87–0.93) ( $n = 12$ ) length of genital capsule, occupying ca. 0.6 distance from base of MVP to apex of gonostyli; CR extending ca. 0.5 distance from MVP to base of genital capsule. *Aedeagus*:  $0.62 \pm 0.03$  (0.57–0.67) ( $n = 12$ ) as long as hind tibia, ca. same length as genital capsule, apodemes comprising  $0.55 \pm 0.02$  (0.50–0.55) total length of aedeagus.

Female.—*Ovipositor*:  $0.87 \pm 0.06$  (0.8–1.0) ( $n = 4$ ) as long as hind tibia.

Type information.—Holotype ♂ and allotype ♀ from CALIFORNIA, Riverside Co., Riverside (University of California campus), ex. *Agraulis vanillae* L. (Nymphalidae) egg on *Passiflora* sp.; 12 July 1980; H. Browning, collr.

Geographic distribution.—Southern California.

Records.—UNITED STATES. *California*: Kern Co., Arvin, ex. *Trichoplusia ni* eggs on *Sonchus* sp., 16 September 1980; Tehachapi, ex. *Vanessa* sp. eggs on *Malva parviflora*, 16 September 1980. Riverside Co., Riverside, ex. *Agraulis vanillae* eggs on *Passiflora* sp., 12 July 1980.

Remarks.—*Trichogramma browningi* resembles other species that have a relatively broad, subtriangular DEG. These include the Old World species *T. chilotraeae* Nagaraja & Nagarkatti (1969), *T. kalkae* Schulten & Feijen (1978), *T. ostrimae* Pang & Chen (1974), *T. pinneyi* Schulten & Feijen (1978), *T. mwanzai* Schulten & Feijen (1982), and the North American *T. brevicapillum* Pinto & Platner (Pinto et al., 1978). The short MVP, however, separates it from all except *T. brevicapillum* from which it is distinguished primarily by the much longer flagellar setae, incomplete anterior and posterior vein tracts on the hindwings, and the less densely setate forewings.

Etymology.—Named for Dr. Harold Browning, the first collector of this species.

### *Trichogramma nomlaki* Pinto & Oatman, NEW SPECIES

Fig. 3a, b

Description based on a single male collected by screen sweeping in Glenn County, California. The genitalic structure of this species is the most highly modified yet reported in *Trichogramma*.

Color.—Based on unique male mounted in Hoyer's medium. Uniformly dark brown except tibiae, tarsi and antennae distinctly lighter.

Male.—*Length*: 0.75 mm. *Antenna*: Flagellum elongate, broadly arcuate at basal half, 5.4 as long as wide, equal in length to hind tibia; setae moderately long, tapering abruptly at apex, length of longest seta 2.20 maximum width of flagellum, 40 in number. *Forewing*: Numerous setae between moderately well defined vein tracts, area between 4th and 5th tracts with 43 setae; length of longest postapical seta 0.17 greater than maximum width of hind tibia, 0.10 maximum width of wing. *Hindwing*: Posterior vein tract with 8 short setae, extending 0.5 length of middle tract; anterior tract of six setae, subequal in length to posterior tract. *Mesoscutellum*: Anterior pair of setae very long, subequal in length and width to posterior pair. *Genital capsule*: Unique for genus, with gonostyli, DEG and MVP highly reduced, CS strongly and uniformly sclerotized, apparently bilobed, consisting of a large subconical lobe with a smaller appendage ventromedially, lacking apical spine; CS extending further posteriorly than all other genital structures. Genital capsule broad, 0.65 as wide as long; gonostyli ventral to CS, attaining

0.93 length of genital capsule, distance from apex to base of MVP 0.18 the distance to base of genital capsule; DEG arcuate, not lobed or notched at sides, narrowing medially and lacking the usual posteromedial extension, attaining 0.77 length of genital capsule; MVP obsolescent, distance from obsolescent MVP to apex of CS 0.28 length of genital capsule; CR very well developed, extending from MVP to just short of genital capsule base. *Aedeagus*: Short and broad, only 0.49 as long as hind tibia, ca. same length as genital capsule, apodemes comprising 0.33 total length of aedeagus.

Female.—Unknown.

Type information.—Holotype, unique ♂, from CALIFORNIA, Glenn Co., Stony Creek, 5 mi. N. Elk Creek; screen sweeping riparian vegetation; 9 June 1983; J. D. Pinto, collr.

Geographic distribution.—Known only from the type locality in northern California.

Remarks.—*Trichogramma nomlaki* differs dramatically from all known congeners. It is the only species lacking a posteromedial extension of the DEG and with uniquely modified CS that extend further posteriorly than the gonostyli. The very large anterior mesoscutellar setae distinguish *T. nomlaki* from all species except *T. semifumatum* (Perkins) (see Oatman et al., 1982). Although not readily comparable to any other species, the male genitalia in *T. nomlaki* are most similar to those of *T. atopovirilia*, recently described from Guatemala and Mexico (Oatman & Platner, 1983). In the latter, the DEG is produced posteromedially but only slightly so. Also, as in *T. nomlaki*, the genital capsule is rather broad. The dorsal CS relative to the gonostyli is a trait shared with both *T. atopovirilia* and *T. drepanophorum*, new species (see below).

The gonostyli and CS are so greatly modified in *T. nomlaki* that there is some question whether homologies have been determined correctly. We have identified these structures primarily by their relative position and their relationship to the aedeagus. The presumptive CS are distinctly dorsal to the presumptive gonostyli, and the aedeagus rests between the CS and the DEG. This structural relationship also occurs in *T. drepanophorum* and *T. atopovirilia*. The gonostyli are lateral to the CS in most *Trichogramma*. We are not aware of any species with gonostyli dorsal to the CS which would be the other possible interpretation of homologies in *T. nomlaki*.

Although the male genitalia of *T. nomlaki* are exceptional for *Trichogramma*, all other features examined are typical of the genus.

Etymology.—Nomlaki is the name of the Indian people indigenous to the type locality and surrounding area.

#### *Trichogramma offella* Pinto & Oatman, NEW SPECIES

Fig. 4

Description based on P<sub>1</sub> material from the type locality.

Color.—Based on specimens mounted in Hoyer's medium. Both sexes dark brown except antennae, head above eyes, tibiae, tarsi, and propodeal area paler.

Male.—*Length*: 0.5–0.7 mm. *Antenna*: Flagellum elongate, broadly arcuate at base,  $6.30 \pm 0.45$  (5.8–6.9) ( $n = 5$ ) as long as wide,  $1.17 \pm 0.02$  (1.15–1.20) ( $n = 5$ ) as long as hind tibia; setae elongate, tapering gradually to apex, length of longest seta  $3.43 \pm 0.14$  (3.2–3.5) ( $n = 5$ ) maximum width of flagellum, ca. 40 in number.

*Forewing*: Vein tracts well defined, area between 4th and 5th tracts with 16–24 setae; length of longest postapical seta on margin ca. 1.6 maximum width of hind tibia and 0.2 greatest width of wing. *Hindwing*: Posterior vein tract of 5–7 setae, extending 0.3–0.7 length of middle tract; anterior tract absent. *Mesoscutellum*: Anterior pair of setae short, fine, ca. 0.2 length of posterior pair. *Genital capsule*: Moderately broad, subrhomboidal in shape, sides anterior and posterior to widest point straight, gradually convergent,  $0.43 \pm 0.01$  (0.41–0.45) ( $n = 5$ ) as wide as long; gonostyli (from apex to base of MVP) ca. 0.2 length of genital capsule; DEG and CS extending to a similar level considerably beyond MVP; DEG not lobed or notched basally, rather abruptly narrowed posterior from widest point and then more gradually so to apex, posterior extension lingulate, subapical width ca. 0.5 distance between gonostyli, attaining  $0.91 \pm 0.01$  (0.90–0.93) ( $n = 5$ ) length of genital capsule; MVP short, narrowly triangular, apex anterior to that of CS and DEG, attaining  $0.85 \pm 0.01$  (0.84–0.87) ( $n = 5$ ) length of genital capsule; CS subsinuate, abruptly and asymmetrically narrowed at center, attaining  $0.94 \pm 0.01$  (0.92–0.95) length of genital capsule; CR extending ca. 0.5 the distance from MVP to base of genital capsule. *Aedeagus*:  $0.80 \pm 0.03$  (0.76–0.83) ( $n = 5$ ) as long as hind tibia; ca. same length as genital capsule, apodemes comprising ca. 0.5 total length of aedeagus.

Female.—*Ovipositor*: Of different length in the two females in type series; 0.22 mm (1.15 length of hind tibia) in one, and 0.17 mm (0.88 length of hind tibia) in the other.

Type information.—Holotype  $\delta$  from LOUISIANA, Crowley; ex. *Chilo plejadellus* Zincken (Pyralidae) egg on rice; 10 September 1978; S. V. Rama Rao, collr. Allotype not designated.

Geographic distribution.—Known only from the type locality in southern Louisiana.

Remarks.—The subsinuate chelate structures which closely approach the gonostyli combined with the relatively short MVP, the relatively narrow DEG, and the long flagellar setae characterize *T. offella*. The male genitalia of this species are most similar to that of *T. polychrosis* Chen & Pang (1981). The latter differs, however, by the longer chitinized ridge which extends to the base of the genital capsule, the much shorter flagellar setae (only ca.  $2.4 \times$  maximum flagellar width) and its paler coloration. *Trichogramma flandersi* Nagaraja and Nagarkatti has similarly shaped CS but in that species the DEG is extremely long and wide, and the MVP is inconspicuous. Although asymmetrical CS also occur in *T. atopovirilia* and *T. drepanophorum* they are quite different in shape in both.

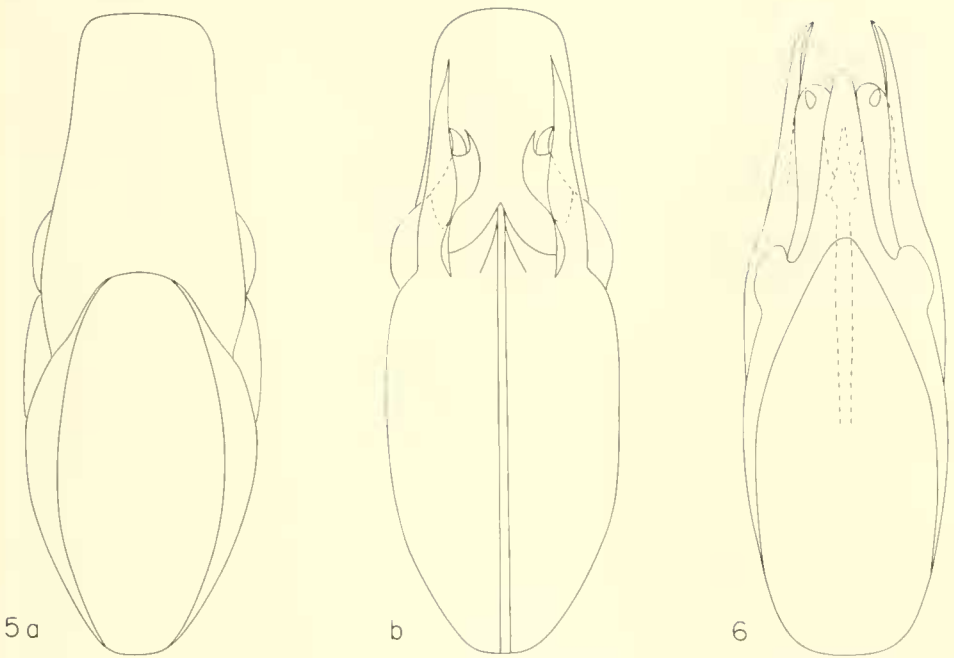
Etymology.—*Offella* is a Latin noun meaning "little bit."

### *Trichogramma drepanophorum* Pinto & Oatman, NEW SPECIES

Fig. 5a, b

Description based on original  $P_1$  material, and  $F_1$  material reared on eggs of *Trichoplusia ni* at 23–27°C and ca. 50% R.H.

Color.—Based on specimens freshly killed in 70% ethanol. Sexes similar. Head yellow above eyes, fumate to black in front of, between and below eyes; thorax, abdomen, coxae and femora black tinged with yellow, most yellow along sutures and intersegmentally. Antennae, tibiae and tarsi pale yellow; antenna fumate basally in most females.



Figs. 5-6. Male genitalia of *Trichogramma* spp. 5a, *T. drepanophorum* (dorsal view, length = 0.12 mm); 5b, same (ventral view). 6, *T. inyoense* (dorsal view, length = 0.16 mm).

Male.—*Length*: Ca. 0.7 mm ( $F_1$  material). *Antenna*: Flagellum elongate, broadly arcuate at base,  $5.82 \pm 0.18$  (5.5–6.0) ( $n = 5$ ) as long as wide;  $1.09 \pm 0.03$  (1.06–1.12) ( $n = 5$ ) as long as hind tibia; setae moderately long, tapering abruptly at apex, length of longest seta  $2.42 \pm 0.10$  (2.3–2.6) ( $n = 5$ ) as long as maximum flagellar width, ca. 50 in number. *Forewing*: Vein tracts well defined, a moderate number of setae between tracts, area between 4th and 5th tracts with 16–25 setae; length of longest postapical seta on margin ca. 1.3 maximum width of hind tibia and 0.10 maximum width of wing. *Hindwing*: Posterior vein tract of 5–8 setae, extending ca. 0.5 length of middle tract; anterior tract consisting of only 1 seta. *Mesoscutellum*: Anterior pair of setae moderately long, varying from 0.3–0.5 length of posterior pair. *Genital capsule*: Moderately narrow,  $0.35 \pm 0.001$  (0.34–0.35) ( $n = 5$ ) as wide as long, DEG broadly notched at base, very broad and elongate, extending well beyond apex of gonostyli, subapical width greater than distance between apex of gonostyli and slightly greater than 0.5 the maximum width of genital capsule; gonostyli very attenuate apically, attaining  $0.91 \pm 0.02$  (0.89–0.93) ( $n = 5$ ) length of genital capsule, distance from apex to base of MVP ca. 0.3 the distance to base of genital capsule; MVP moderately long, broadly subtriangular, projecting somewhat posteroventrally, apex anterior to that of CS, attaining  $0.75 \pm 0.01$  (0.7–0.8) ( $n = 5$ ) the length of genital capsule; CS highly modified, positioned dorsal to gonostyli, apical 0.67 very well sclerotized and falcate in shape, apex directed laterally, attaining  $0.86 \pm 0.01$  (0.85–0.87) ( $n = 5$ ) length of genital capsule; CR very well developed, extending from MVP to base of genital capsule. *Aedeagus*: Relatively short,  $0.58 \pm 0.03$  (0.5–0.6) ( $n = 5$ )



as long as hind tibia and ca. 0.8 as long as genital capsule, apodemes not readily distinguishable under light microscope, comprising ca. 0.5 ? the total length.

Female.—*Ovipositor*:  $1.16 \pm 0.04$  (1.1–1.2) ( $n = 4$ ) length of hind tibia.

Type information.—Holotype ♂ and allotype ♀ from MISSISSIPPI, Hattiesburg; ex. *Limenitis archippus* (Cramer) (Nymphalidae) egg on *Salix* sp.; 23 September 1983; E. R. Oatman & J. D. Pinto, collrs. Types represent  $F_1$  culture material.

Geographic distribution.—Southeastern Mississippi, USA.

Records.—UNITED STATES. Mississippi. Hattiesburg, ex. *Limenitis archippus* and unidentified Sphingidae eggs on *Salix* sp., 23 September 1983.

Remarks.—*Trichogramma drepanophorum* is one of the most distinctive species in the genus. The highly sclerotized, falcate digit of the CS separates it from all known congeners. The well developed CR, which totally bisects the genital capsule below the MVP, and the greatly enlarged DEG are additional distinguishing features. In *T. hesperidis* Nagaraja, *T. flandersi* Nagaraja & Nagarkatti, and *T. linguatum* Pang & Chen, the DEG extends beyond the apex of the gonostyli as in *T. drepanophorum* but it is narrower in these species. A similarly broad but shorter DEG is found in *T. fasciatum* (Perkins) (see Pinto et al., 1978) and *T. cephaliciae* Hochmut & Martinek (1963). The dorsal position of the CS relative to the gonostyli also occurs in *T. atopovirilia* Oatman & Platner, and *T. nomlaki*, new species (see above). Although *T. drepanophorum*, *T. atopovirilia*, and *T. nomlaki* are very distinctive, all three have highly modified, dorsally positioned CS and very well developed CR.

Etymology.—Greek: "sickle bearer"; in reference to the sickle-like chelate structures.

### *Trichogramma inyoense* Pinto & Oatman, NEW SPECIES

Fig. 6

Description based on culture material reared on *Trichoplusia ni* at 23–27°C and ca. 50% R.H.

Color.—Based on specimens mounted in Hoyer's medium. Both sexes dark brown except antennae, head, tibiae, tarsi and propodeal area paler.

Male.—*Length*: ca. 0.7 mm. *Antenna*: Flagellum elongate, arcuate at base,  $6.73 \pm 0.17$  (6.5–6.9) ( $n = 4$ ) as long as wide,  $1.09 \pm 0.04$  (1.05–1.14) ( $n = 4$ ) as long as hind tibia; setae long, gradually tapering to apex, length of longest  $3.50 \pm 0.18$  (3.3–3.8) ( $n = 4$ ) maximum width of flagellum, ca. 50 in number. *Forewing*: Vein tracts well defined, with numerous setae between, area between 4th and 5th tracts with 26–49 setae; length of longest postapical seta on margin ca. 1.6 maximum width of hind tibia and 0.1 maximum length of wing. *Hindwing*: Posterior vein tract of 8–9 setae, extending 0.4–0.6 length of middle tract; anterior tract of 4–7 setae, only slightly shorter than posterior tract, extending 0.4–0.5 length of middle tract. *Mesoscutellum*: Anterior pair of setae short, fine, only 0.1–0.2 length of posterior pair. *Genital capsule*: Moderately elongate,  $0.33 \pm 0.02$  (0.31–0.35) ( $n = 4$ ) as wide as long; gonostyli (from apex to base of MVP) comprising ca. 0.25 length of genital capsule; DEG elongate, with large posteriorly projecting lateral lobes, posterior extension lingulate, subapical width ca. 0.5 distance between apex of gonostyli, apex attaining  $0.93 \pm 0.004$  (0.90–0.93) ( $n = 3$ ) length of genital capsule; MVP elongate, narrowly triangular, apex anterior to that of DEG and CS, attaining  $0.85 \pm 0.02$  (0.84–0.88) ( $n = 4$ ) length of genital capsule; CS apex

at similar level as that of DEG, attaining  $0.92 \pm 0.01$  (0.90–0.93) ( $n = 3$ ) length of genital capsule; CR extending ca. 0.5 distance from MVP to base of genital capsule. *Aedeagus*:  $0.84 \pm 0.03$  (0.8–0.9) ( $n = 4$ ) as long as hind tibia, and ca. 0.9 as long as genital capsule, apodemes comprising  $0.51 \pm 0.02$  (0.48–0.52) ( $n = 4$ ) its total length.

Female.—*Ovipositor*:  $1.15 \pm 0.03$  (1.1–1.2) ( $n = 4$ ) as long as hind tibia.

Type information.—Holotype ♂ and allotype ♀ from CALIFORNIA, Inyo Co., Independence Creek, ca. 6 mi. W. Independence (ca. 6000 ft. elev.); ex. undetermined Lepidoptera egg on *Salix* sp.; 25 August 1972; E. R. Oatman, collr.

Geographic distribution.—Known only from the type locality in east central California.

Remarks.—This species differs from *T. pretiosum* Riley, perhaps its closest relative, by the well defined, posteriorly projecting lateral lobes of the DEG, and its darker coloration.

Etymology.—Inyo is the name of the county of the type locality.

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#### LITERATURE CITED

- Chen, T. and X. Pang. 1981. *Trichogramma polychrosis*, a new species of Trichogrammatidae (Hymenoptera). Zool. Res. 2: 333–335.
- Hochmut, R. and V. Martinek. 1963. Beitrag zur Kenntnis der mitteleuropäischen Arten und Rassen der Gattung *Trichogramma* Westw. (Hymenoptera, Trichogrammatidae). Z. Angew. Entomol. 52: 255–274.
- Nagaraja, H. 1973. On some new species of Indian *Trichogramma* (Hymenoptera: Trichogrammatidae). Orient. Insects 7: 275–290.
- Nagaraja, H. and S. Nagarkatti. 1969. Three new species of *Trichogramma* (Hymenoptera: Trichogrammatidae) from India. Entomophaga 14: 393–400.
- Nagarkatti, S. 1975. Two new species of *Trichogramma* (Hym.: Trichogrammatidae) from the U.S.A. Entomophaga 20: 245–248.
- Nagarkatti, S. and H. Nagaraja. 1971. Redescriptions of some known species of *Trichogramma* (Hym., Trichogrammatidae), showing the importance of the male genitalia as a diagnostic character. Bull. Entomol. Res. 61: 13–31.
- Oatman, E. R., J. D. Pinto, and G. R. Platner. 1982. *Trichogramma* (Hymenoptera: Trichogrammatidae) of Hawaii. Pac. Insects 24: 1–24.
- Oatman, E. R. and G. R. Platner. 1983. A new species of *Trichogramma* (Hymenoptera: Trichogrammatidae), with notes on other species collected in Guatemala. Proc. Entomol. Soc. Wash. 85: 710–713.
- Pang, X. and T. Chen. 1974. *Trichogramma* of China (Hymenoptera: Trichogrammatidae). Acta Entomol. Sin. 17: 441–454.
- Pinto, J. D., G. R. Platner, and E. R. Oatman. 1978. Clarification of the identity of several common species of North American *Trichogramma* (Hymenoptera: Trichogrammatidae). Ann. Entomol. Soc. Am. 71: 169–180.
- Schulten, G. G. M. and H. R. Feijen. 1978. Two new species of *Trichogramma* (Hymenoptera: Trichogrammatidae) from Malawi; egg parasitoids of *Diopsis macrophtalma* Dalman (Diptera: Diopsidae). Entomol. Ber. (Amst.) 38: 25–29.
- . 1982. A new species of *Trichogramma* (Hymenoptera: Trichogrammatidae) from Malawi, parasitizing eggs of *Chilo diffusilineus* (de Jaonnis). Entomol. Ber. (Amst.) 42: 142–144.
- Sorokina, A. 1978. New data on taxonomy and biology of the genus *Trichogramma* (Hymenoptera, Chalcidoidea). Zool. Zh. 57: 1442–1444. (In Russian).

- Sugonjaev, E. S. and A. P. Sorokina. 1976. New species of the genus *Trichogramma* (Hymenoptera, Chalcidoidea) from Middle Asia and Altai. Zool. Zh. 55: 777-779. (In Russian).
- Voegelé, J. 1982. Découverte et description de deux nouvelles espèces de Trichogrammes du groupe Euproctidis, *Trichogramma brassicae* et *T. pinto* (Hym. Trichogrammatidae). Ann. Soc. Entomol. Fr. (N.S.) 18: 163-166.